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## SHELL COLLECTING ON THE WEST COAST OF BAJA CALIFORNIA.

BY H. N. LOWE.

My long anticipated collecting trip to the coast of Lower California was at last realized in the spring of 1912, when a party was being made up for a month's cruise in Mexican waters.

The staunch little power yacht "Flyer" was chartered for the trip. Besides the crew of three, our party was made up of the owner of the boat, the taxidermist, the tourist, the ornithologist, and the conchologist.

After a day spent at San Diego securing our clearance papers and half a day at Ensenada with the Mexican authorities, we were at last on our way. We cast anchor for the night in a small cove a few miles south of Point Banda. There had been a slow drizzle of rain all day and on going ashore I secured some five live specimens of *Helix stearnsiana* walking over the bushes. On Todos Santos Islands and San Martin (the southern limit of the species) I found live specimens under loose rocks, but none under or near any of the numerous species of cactus which thrive here. On Santa Catalina Island the nearly allied form *Helix kelletti* lives on the cactus (cholla) and is found under it at all seasons of the year. A few specimens of *Glyptostoma newberryanum* were found on the Todos Santos.

At Point Banda I secured my first *Monoceros lugubre*, and though a common species it gave me pleasure to find something I had never before collected. The specimens found here were very small only

about a quarter of the size of the fine ones further south from San Martin and San Gerónimo Islands. Further south, at Cape Collette, large beds of *Mytilus californicus* were uncovered at low tide. Among the mussels were fine large *Monoceros pauciliratum* Stearns and *Macron lividus*. Wedged in between and attached to the byssus of the mussels we found many *Tapes grata* Sby. and *Tapes staminea* Conr., a rather unique place for that genus to be found. A few good *Saxicava arctica* and one large *Entodesma saxicola* were added to the list. The largest of the *Mytilus* were worm-eaten, wave worn and battered, and altogether the most disreputable looking specimens I had ever seen. Many of the worst shells had quite pretty pearls snugly hidden in their internal anatomy, some having as many as twenty-six small "seed pearls" and others but a single large one. The pearls from this species, unlike the elegant ones from the *Haliotis*, have no commercial value, lacking sufficient luster. The *Tegula gallina* Fbs. found here were mostly var. *tincta* Hemphill. The *Monoceros pauciliratum* were right in their prime here, though we found a few as far south as Cedros. *Monoceros engonatum* Conr. although small were very good specimens but we found none south of here.

Another day's sail brought us to San Martin Island, lying five leagues out from the "Bay of the Five Hills." It is a small island of very evident volcanic origin, the crater of its extinct volcano being visible for many miles. On climbing to the summit of the crater we were dazzled by a wealth of golden daisies which carpeted the interior. The only land shell to be found was the ever present *Helix stearnsiana*, but this seemed to be its southern limit, as we found few here and none further south. A natural breakwater of black lava boulders runs out for half a mile from the south end forming one of the best anchorages for small vessels on the coast. This island, like San Gerónimo, is the breeding place of thousands of sea birds which come here in the spring—gulls, cormorants, terns, osprey, turnstones, oyster-catchers, duck hawk, surf birds, pelicans, etc. On San Gerónimo Is. hundreds of auklets or "mutton birds" were nesting in burrows which they dig in the sandy earth, laying but one white egg about the size of a pigeon's egg.

The wild fauna of these southern islands seems to be having hard luck. On Guadalupe Is. the domestic cat, run wild, has about exterminated a rare petrel and several other birds from that island.

On Cedros the dogs have entirely cleared out a rare dwarf species of deer which formerly lived here. On Todos Santos the common rat has in the last few years made life so strenuous for the sea birds that they have given up nesting here entirely. Since birds' eggs have been cut out of the rat's bill-of-fare, they have developed a fondness for snails and I fear in a year or two 'Todos Santos will be as destitute of snails as it is of birds' eggs.

San Gerónimo Island is smaller than San Martin, only about one and a half miles in length and as bare as a picked hen. Its barren sandy soil seems incapable of supporting any vegetation save a few stunted bushes. Only very dead specimens of *Helix levis* var. near *crassula* Dall were obtainable, though I made a thorough and systematic search for them. The reefs on the west side yielded a number of good small species.

Margarites acuticostatus Cpr.	Eulima bitorta Van.
Mitromorpha gracilior Hemphill.	Modiolus opifex Say.
Truncatella stimpsoni Stearns	Milneria minima Dall.
Arca gradata Brod. & Sby.	Cardita subquadrata Cpr.
Mitra lowei Dall.	Columbella penicillata Cpr.
Marginella varia.	Fusus luteopictus Dall.
Marginella politula Cooper.	Lucina californica Conr.
Triforis pedroana B.	Hipponyx antiquatus Linn.
Bittium attenuatum Cpr.	Gadinia reticulata Sby.
Bittium munitum munitoides B.	Opalia crenatoides Cpr.
Cerithiopsis alcima B.	Ocenebra gracillima Stearns.
Cerithiopsis pedroana B.	Pecten latiauritus Cpr.
Cerithiopsis carpenteri B.	Acmaea asmi Midd.
Turbonilla buttoni D. & B.	Mitromorpha filosa Gabb.
Odostomia helga D. & B.	

On San Gerónimo we found *Acmaea persona* Esch and var. *digitalis*, also a form of *A. spectrum* which seemed to be copying the peculiar shape of *A. persona*, *Acmaea scabra*, *A. pelta* var. *naceloides* and *Lottia gigantea* Gray were also found on the reefs.

The *Tegula gallina* were the largest I have ever seen.

We left San Gerónimo Island rather hurriedly the evening of the second day as a southeaster was coming up. Next morning found us at the north end of Cedros Island where the Esperanza Mining Company had their wharf and buildings for shipping the gold ore from their mines in the interior of the island. There were prac-

tically no marine species at this end of the island as the shore line drops into deep water. After several days' search I was well repaid by finding some fine live specimens of the beautiful *Helix veatchii* (Newc.) Tryon. This species varies much from almost white to dark many-banded specimens. At first I found a few fairly good dead shells, but search as I might under stones, through cactus, and chaparral not a live one could I find, until by chance I spied one roosting on a limb of the dwarf oak peculiar to this island. This species seems to be entirely a tree snail.

At the south end of the island a *Helix* identified by Dr. Pilsbry with *H. canescens* Ads. and Rve. occurs in colonies in exposed places on rocks. *H. veatchii* is scattered over a larger area on the island, the many color varieties being found sometimes on the same tree.

At South Bay Cedros Island we collected under stones at low water the following :

Semele rupium Sby.	Callistochiton decoratus.
Vermetus fewkesii Yates.	Chaetopleura gemmea Cpr.
Scurria mesoleuca Mke.	Cyanoplax hartwegii.
Latirus lugubris C. B. Ads.	Nuttallina scabra.
Drillia moesta Cpr.	Murex incisa.
Trivia solandri.	Murex nuttalli Conr.
Arca reeviana d Orb.	Lucapina crenulata.
Arca gradata B. & S.	Macron lividus A. Ads.
Columbella fasciata Sby.	Amphissa versicolor Dall.
Mopalia muscosa Gld.	Tegula aureotinctum Fbs.
Ishnochiton conspicuus Cpr.	Tegula gallina Fbs.
Ishnochiton acrior Cpr.	Fissurella volcano Rve.
Ishnochiton didymus B.	Fissurella volcano var. crucifera
Ishnochiton clatheratus Cpr.	Dall.
Callistochiton crassicosatus Cpr.	Megatebennus bimaculatus.

Cedros Island seems to be the northern limit of the large red crab *Grapsus grapsus*. They are very hard to catch for the moment they see one approaching, they clatter off pell-mell over the rocks as fast as their ten legs will carry them and jump into deep water where they swim like a fish.

On a pebble beach midway the east coast of Cedros I found the following beach-worn shells cast up by some storm; the list is interesting in that it shows the intermingling of northern and southern species at this point.

Cypraea spadicea Gray.	Arca grandis B. & S.
Ranella californica.	Dosinia ponderosa.
Pomaulax undosus Wood.	Pecten subnodosus.
Conus californicus Conr.	Fusus dupetithouarsi Kiener.
Semele decisa Conr.	Drillia penicillata Cpr.
Uvanilla regina Stearns.	Monoceros muricatum Brod.
Venus fordii Yates.	Crucibulum imbricatum.
Triton gibbosum.	Purpura biserialis Blve.
Macron aethiops.	Venus undatella Sby.
Cymatium corrugatum Lam.	Cassis sp.
Conus gradatus Mawe.	Oniscia sp.

For several miles along the cliffs on the southwest coast of Cedros extends a well marked stratum about a foot in thickness of *Lucina californica*, and very strangely not another marine species was found with them.

In about ten fathoms off Palm Spring on the east coast we succeeded in making one haul of the dredge with the following results: *Hemicardium biangulatum*. *Nassa insculpta*.  
*Pecten latiauritus*.

A number of small or difficult species collected on the trip remain to be identified. A list of them will appear later. Dr. Pilsbry has in press an illustrated paper on the Helices of the *Micrarionta* group collected.

As the weather was unfavorable for a continued southerly cruise, we reluctantly headed the "Flyer" for home where we arrived just four weeks from the time of starting.

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#### THE UNIONE FAUNA OF THE GREAT LAKES.

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BY BRYANT WALKER, SC. D.

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(Continued from page 23.)

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The distribution of these two species, *Unio complanatus* and *U. gibbosus* (fig. 2), in a general way, shows the relative position the Atlantic and Mississippian faunas occupy in the region of the Great Lakes. Of course there are variations in the range of individual species, but these, on the whole, do not interfere with the general proposition to be discussed in this paper.